

## AN INVERTIBLE CALL IDENTIFIER DISPLAY

### FIELD OF THE INVENTION:

The purpose of the present invention is the upgrading of an electronic device for the identification of incoming phone calls, with the innovative aspect that this specific device presents the possibility of inverting both the characters and the sequence of data fields displayed on the liquid crystal display.

### BACKGROUND:

Phone call identifiers are common electronic devices nowadays; such devices employ a micro-controller (7), a phone line (6) multi-frequency signal decoder (5), a display (1), an energy source (2), data storage memory (11), etc.

The display has the function of showing the number of the telephone from which the phone call is originating, or the name of the caller, or also the name of the person to whom a call is being made. Depending upon the external design of the identifier, the display can be viewed within a wider or narrower arc or angle range.

Current phone call identifiers have been designed in such a way that there is only one orientation for the data display; either horizontally or vertically. Whatever the position, whoever is using the device must always rotate the LCD horizontally to face himself, for better legibility.

### SUMMARY OF THE INVENTION:

This invention features a combination of hardware (LCD) and software (micro-controller) which enables vertical inversion of the data sequence presented on the display, once an external button or sensor is activated or pressed.

LCD (Liquid Crystal Display) modules are interfaces in microprocessor systems, which utilize their own controlling devices and may be programmed according to their matrix,

receiving an operation routine via software. Such a matrix is determined when the display is manufactured, during which respective patterns of dots or pixels are defined, collectively forming either a letter, a number and/or icons such as a telephone (40), an envelope (41), etc. In the same way, other dots may be eliminated to simplify the system and its programming.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1: shows the operational diagram of the identifier of calls, where a button to activate the display inversion has been added (9), and is connected to the micro-controller. The diagram also identifies the keyboard of the call identifier (8), the module receiving multi-frequency signals (4), the module of an energy source (3), and the processor (10).

FIGURE 2: illustrates the identifier casing, which can be oriented horizontally or vertically. In the vertical option, the display is in the original orientation (21). Whenever the person using the device wishes to place the device into the horizontal orientation, all such person has to do is press the inversion button for a few seconds and the controller will alter the instructions to the display screen correspondingly.

FIGURE 3: shows the matrix of the display, where one can find the lines or data fields for names (31), numbers (32), minutes (33), and logo (34). In the first orientation, shown in the boxes at left, the display may be switched to "stand-by" mode (35), or in the process of identifying an incoming call. In the second orientation shown in the boxes at right, the display is inverted during stand-by mode (36) as shown at top right and also when turned on or initialized (38), as shown at bottom right.

It is apparent that, in both orientations, the telephone number is displayed on that part of the screen which is closest to the viewer, that is, the upper part of the screen when in the vertical orientation and the lower part of the screen when in the horizontal orientation.

According to the illustrations, the display of the present invention is based upon a new matrix and implementation of new instructions and codes, which, once recorded in its circuits, follow the reorganization instructions for the active dots, every time the controller receives a command by means of a button, sensor, or any other form of electric signal.

The applied matrix consists of pre-determined fields which will form the letter or number characters. The inversion of the display is not symmetrical, that is, the fields will also be presented in the new lay-out, but without affecting the reading of the data. In other words, the field which displays names (31), for instance, will be seen in the upper part of the display in one orientation, and in the lower part in the other; the same happening with the fields for numbers (32), minutes (33) and date (39). Icons such as manufacturer's logo (34), telephone (40) and envelope (41), have double matrix, that is, they are inverted so as to remain side by side, so that the corresponding version is activated according to the orientation of the display. Since they consist of predefined gathered or grouped dots, each icon is activated by using only one code.

Therefore, the invention presents a number of advantages over prior art call displays, besides the innovative aspect, thus deserving the legal protection being requested.

1. (Presently Amended) An invertible call identifier display ~~inversion~~, comprising, a in combination, of a hardware liquid crystal display (LCD) screen and software in a microcontroller, that enable the vertical inversion of both characters and a sequence of data fields presented on the screen, ~~upon pressing responsive to~~ an external button ~~or sensor~~; an external button, ~~for the activation of the display inverter connected to the microcontroller and adapted to activate said vertical inversion by signalling said microcontroller;~~ a said display ~~with having~~ a differentiated matrix for the formation of characters in the respective data fields for numbers, minutes, and dates; and A1 a circuit that obeys instructions to reorganize ~~the active dots~~ pixels of said liquid crystal display so as to alter the sequence of presentation of said data fields, every time the microcontroller receives a command via activation button, ~~sensor or any other form electrical~~ an activating signal from said button. ~~, the following icons or figures: manufacturer's logo, telephone and envelope and also having double matrix, so that they are inverted side by side.~~

2. (New) An invertible call identifier display according to claim 1, wherein said LCD is adapted to simultaneously display a telephone logo, an envelope logo, and a manufacturer's logo.

3. (New) An invertible call identifier display according to claim 2, wherein relative positions of said logos on said LCD are inverted when said vertical inversion is carried out.

4. (New) An invertible call identifier display, comprising, in combination,

a hardware liquid crystal display (LCD) screen and software in a microcontroller, that enable the vertical inversion of both characters and a sequence of data fields presented on the screen, responsive to an external sensor;

an external sensor connected to the microcontroller and adapted to activate said vertical inversion by signalling said microcontroller;

11 said display having a differentiated matrix for formation of characters in respective data fields for numbers, minutes, and dates; and

a circuit that obeys instructions to reorganize active pixels of said liquid crystal display so as to alter the sequence of presentation of said data fields, every time the microcontroller receives an activating signal from said sensor.